Nutrition News

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AVAILABILITY OF AMINO ACIDS FROM FOODS

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In order for the body to synthesize tissue proteins, all the required amino acids must be simultaneously available at the site of synthesis. Calories, too, from fat and carbohydrates must be available, as well as all the other essential nutrients.

Not all foods or combinations of foods are equally well-utilized for building body tissues. Factors affecting the efficiency of use are (1) amino acid content; (2) rate and extent of release of essential amino acids from proteins by the digestive enzymes; (3) rates of absorption of individual amino acids; and (4) imbalance of amino acids at the site of synthesis (i.e., excess leucine acts as a structural antagonist to isoleucine.)

Availabilities Reported From Rat Studies

From several laboratories have come data on the availability of amino acids obtained from rat studies, using food and purified proteins of both plant and animal origin. These data are based on one of two measurements as the criterion for availability: (1) weight gain in weanling rats, or weight regain in protein-depleted rats, which measures protein quality as well as availability; or (2) the amount of ingested amino acid minus the amount excreted in feces, corrected for metabolic amino acid in feces. In a few investigations, availabilities have been obtained for a single nutrient by both procedures and the results checked reasonably well.

Lysine Availability of Some Foods

The rate and in some cases the extent of release of lysine from a protein food may decrease when the dry protein is heated at excessively high temperatures, or is heated with carbohydrate. This is probably due to some structural change which makes the protein enzyme-resistant.

The percentage values reported from rat studies for availability of lysine from foods of plant origin are: 58 for purified zein; 70 for wheat; 77 for rolled oats; 85 for rice, and more than 100 percent for soybeans.

Reported percentage availabilities of lysine from meat are: 96 for cooked lamb; 82 for roast beef; and 73 for cooked fresh pork. Lysine in beef and pork shows a higher availability in the raw meat, while the lysine of lamb is more available from the cooked meat.

Ninety-two percent of the lysine in egg albumin is available with a 98 percent availability reported for whole eggs. From the milk protein, casein, one laboratory reports a 102 percent availability, while another group reports 65 percent.

Isoleucine, Methionine and Tryptophan

The reported values for the availability of isoleucine range from 30 percent for zein to 89 percent for cooked fresh pork; with 68 percent for casein and 81 percent for roast beef.

Methionine availabilities have been reported as follows: 44 percent for unheated soybean flakes; 74 percent for soybean grits; 72 percent for roast beef; 78 percent for cooked fresh pork; and 83 percent for casein. The availability of methionine has been reported as higher in cooked than in raw beef, and lower in cooked pork.

The availability of tryptophan has been reported for three foods: 103 percent for roast beef; 89 percent for roast pork; and 87 percent for soybeans.

Experiments With Human Subjects

In our laboratory, availability data have been obtained with healthy, male

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subjects, ranging from 22 to 28 years of age. Their caloric needs for maintenance of body weight were established prior to the eight test periods.

In the first test period the men were kept on a low nitrogen diet (0.9 grams nitrogen) consisting mainly of fruits and vegetables with enough sucrose added to provide their caloric needs. Test foods were added, depending upon body weights, in approximately these amounts: 12 eggs; 2 quarts of milk for the milk period; 1 quart of milk plus 6 eggs for the milk plus egg period; 1 pint of cottage cheese; 9 to 10 ounces of ground pork muscle; and 6 to 8 ounces of peanut butter. The egg protein, because of its reported high biological value, was used as a reference protein for comparison of availabilities from the milk, meat and plant proteins.

The availabilities of the eight essential amino acids, cystine and tyrosine were determined. The difference in the

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Glances AT NUTRITION RESEARCH

To aid nutritionists dealing with dietary recommendations, information on how food and food combinations are used by the body has been coupled here with information on dietary practices.

Protein intake and blood cholesterol—Cholesterol and lipoprotein levels were decreased in 9 human subjects by a low protein diet imbalanced in amino acids (low in methionine and marginal in lysine, tryptophan and threonine.) Throughout the tests the subjects consumed daily 2400 calories and 80 gm fat (50 gm from milkfat). When protein intake was decreased from 100 gm of chiefly animal protein daily to 25 gm vegetable protein, all subjects showed a decrease of blood cholesterol, averaging 44 mg cholesterol per 100 ml blood serum.

—Am. J. Clin. Nut. 6:310 (May-June) 1958.

Infant intakes when fed human milk—Six normal full-term infants fed human milk were found at one month of age to consume an average of 218 ml milk per kg body weight per day. This amount of milk provided 147 calories and 2.4 gm protein per kg per day and permitted retention of 180 mg nitrogen per kg body weight per day. These values were reduced between 4½ to 6 months of age to an average intake of 140 ml milk per kg per day which provided 94 calories and 1.5 gm protein per kg per day with retention of 47 mg per kg per day by 6 months of age. For each gram nitrogen retained, infants gained 42.1 gm body weight and maintained an average of 5.2 gm total protein and 6.3 mg urea nitrogen per 100 ml blood serum.

—Pediatrics 22:101 (July) 1958.

Infant feeding in New York State—Only 1 of 4 mothers began to nurse their babies among 1,433 interviewed. Of those who began, ½ had discontinued breast feeding before the infant was 6 weeks old. More mothers of upper class families started to nurse their babies and continued for longer periods than mothers of lower class families. Of mothers who bottle fed babies, ⅓ used ready-prepared mixes and ⅓ used terminal heating to sterilize the formula. At 5 weeks of age, 50 percent of the babies received some solid food. At 9 weeks, 96 percent received some solid food. At the time of interview, 3 to 6 months after birth, 93 percent of the babies received a supplementary vitamin.

—Am. J. Public Health 48:732 (June) 1958.

Fewer babies breast fed in U.S.A.—Breast feeding has declined in the U.S. according to a 1956 survey of 1,904 hospitals. From 2¼ million births, only 21 percent of the babies were breast fed when they left the hospital where born. In 1946, 38 percent of the babies were breast fed upon leaving the hospital.

—Pediatrics 22:116 (July) 1958.

Editor's note: Dr. Watts' study is the only known work in availabilities using human beings. National Dairy Council, as a co-sponsor, is proud to continue her report from page 9, in the space usually devoted to Timely Topics.

amount of amino acid ingested and the amount excreted in the feces was regarded as the amount available.

Availabilities Obtained

In the whole egg, the milk plus egg, and the pork muscle diets the availabilities of the essential and sparing amino acids were similar, ranging from 85 to 95 percent. When milk, cottage cheese, and milk plus egg were given in quantities equal in nitrogen content along with the same basal diet, the availabilities were highest for the milk plus egg diet, next highest for the cottage cheese and lowest for the milk alone. Although the availabilities for the essential amino acids and cystine were lowest in the milk diet, this does not necessarily indicate the amino acids of milk are less available than those of the other test foods. Since the amount of milk consumed in the test was in excess of normal milk consumption, the results can be interpreted as a better utilization of the amino acids from milk at normal intake levels and in combination with another animal protein. The tendency toward a superiority of the egg plus milk diet, when compared with the diets containing egg or milk alone, indicates that these proteins are excellent adjuncts to one another and emphasizes the value of a varied diet.

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Dr. Watts is now on a year's leave of absence for post-doctorate work in nutrition in the Department of Home Economics, University of California, Los Angeles.

VALUE RECEIVED!

Harriet Petley, Principal
Bryan Elementary School, Akron, Ohio

A noted industrialist once said "You can tell me your experiences, but I will buy your dreams." It is an exciting experience to be able to buy or sell a dream. Let me tell you about the Bryan School dream.

Our teaching staff became concerned about the health and welfare of our students. We observed poor concentration, short interest span, poor dental health and poor food habits. In looking for the reasons, we found the community background limited educationally and economically. Many children came to school without breakfast, or ate snacks on the way. The problem, at least in part, was based on the need for nutrition education.

The teachers recognized that if they were to attack the problems as an "all out" school effort, they would need help. The elementary supervisor told us that the Community Nutrition Committee of the Akron Dietetic Association and the Akron Dairy Council, as a community service, offered elementary teachers a "refresher" course on nutrition. Professionally trained home economists from the university and from business, hospital dietitians and public health nutritionists were willing to cooperate with the Board of Education. They would plan a nutrition workshop for elementary teachers. Would Bryan School like to be a Pilot Study Group? The teachers at Bryan School agreed to take part in this cooperative effort.

A plan was made for five, one and one-half hour sessions, at the Dairy Council Office. The teachers liked meeting some place other than at school. For the first half-hour the Dairy Council provided teachers with social relaxation, food and a learning experience. The tasting and discussion of the foods served to them, promoted ideas that could be used in the classroom to add zest to the subject of nutrition.

The five, one-hour sessions included: basic nutrition, three meals in review; methods of integrating nutrition education into the school curriculum; how to reach the parents and the community more effectively; the school childs lunch, at school and at home; audio-visual aids, availability and effective usage.

In January, the Akron Schools have a curriculum planning day. Bryan School centered their planning on the correlation of nutrition education with regular classroom teaching according to grade levels in reading, writing, arithmetic, spelling, science, social studies, language and art. Creative art was to be utilized in the making of lifesize murals, drawings, paintings, food models, poems and songs. Breakfast at school, butter-making and animal feeding demonstrations were to be highlights.

Community participation was to be fostered by a Nutrition Week Open House. Parents, visitors from other elementary schools, and all interested people were to be invited. Children were to display what they had learned through demonstrations and assembly programs.

On the planning day the teachers were also asked to evaluate the Nutrition Clinic. They believed the clinic was one of the most interesting workshops attended. They felt they had become more aware of the importance of food to the body; the dangers of food fads and fallacies. They liked the cooperation and common interest resulting from an "all school" project. They appreciated the Achievement Certificates for completion of the in-service Nutrition Clinic. They liked having professional people from related fields as resource teachers.

After all the integrated projects were completed by each class, the teachers evaluated the results. They said: children were more alert; general health and well-being was improved; family eating habits were improved as children insisted on using more milk and vegetables; better breakfasts were selected with fewer coming to school without eating; less "sweets" were purchased; and a fine bibliography was developed. Finally, nutrition education can be integrated into the school curriculum without sacrificing basic skills!

As a principal, my own evaluation finds it a pleasure to view the staff's enthusiasm, with a common understanding of objectives promoting cooperation and a wholesome competitive spirit. For us, basic concepts have evolved: nutrition education should begin early and be a continuing program in all grades, capitalizing on a child's interest to motivate learning. An in-service activity away from school adds interest and excitement along with the use of reliable community resources, and professional people in related fields lend authenticity and added enthusiasm. I firmly believe nutrition education as an integral part of the school curriculum does give value received!

NUTRITION'S EMISSARIES

Jean H. Hankin, Nutritionist
City of Milwaukee Health Department, Milwaukee, Wisconsin

Personnel of health and welfare agencies have opportunities to function as emissaries of the nutritionist. Resources are available in most communities to assist health workers with program development, teaching methods, and selection of audio-visual materials. Through health departments and other reliable public and business-sponsored community resources, scientific and practical information can be obtained. The use of a bona fide agency is important if we are to combat the activities of food faddists and health quacks!

In any nutrition or health education program, it is essential to remember that people are more important than food patterns. "Health," per se, usually has little success as a motivating agent. We can capitalize on the desire for popularity and social prestige with the adolescent, on the wish for a healthy baby with the expectant mother, on the longing for companionship with the senior citizen. Whenever possible, we should encourage the group to participate in the learning process.

Physicians have ready-made opportunities for teaching nutrition. During the physical examination and subsequent conference, the doctor can obtain a picture of the patient's eating pattern. There may be no need to suggest

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—that when amino acids were added to the normal growth diet of test rats, they were better able to resist infections the Rockefeller Institute for Medical Research reports?

—that Hyppocrates, the father of medicine, recommended milk for children and adults in 500 B.C.?

—that if a normal human baby grew at the same rate as a broiler chick, he would weigh 256 pounds when ten weeks old?

—that over 6700 apple varieties exist?

—that a Michigan State University study proved people could lose 1½ to 2 lbs. a week on an adequate but calorie-restricted diet containing milk, butter, cheese and ice cream along with all the other basic foods?

—that the Bureau of Fisheries estimates only one in ten million oysters reaches full growth and oysters must be two years old before ready to market?

—that young David carried "ten cheeses" to the army, along with other rations the day he slew Goliath?

—that the U. S. Quartermaster Food and Container Institute is testing plastic squeeze bottles filled with milk drinks, and cheese products as a potential space-feeding devise?

THINGS YOU'LL LIKE TO READ

Proceedings of Nutrition Education Conference—April, 1957. U. S. Dept. Agr. Mis. Pub. 745, Nov. 1957. GPO, Washington, D. C. 74 pages, 45¢.

This conference was jointly sponsored by the U. S. Department of Agriculture, through its Nutrition Committee, and the Interagency Committee on Nutrition Education and School Lunch. The purpose was to focus attention on nutrition education and on how to make it more effective. The proceedings include general session talks, highlights from 12 discussion groups, plans for follow-up by participants, and the attendance list.

A History of Nutrition—Elmer V. McCollum. Houghton Mifflin Co., Boston. 1957 $6.00.

The author has traced the observations and speculations of early clinicians on how food affects the sick and the well; of physiologists on how unlike foods are altered by digestion, absorbed and converted into blood and body tissues; of the chemists on the nature of food and its transformation into nutrients. This history of ideas and experiments covers the mid-18th century to 1940. This long look back will instruct as it entertains.

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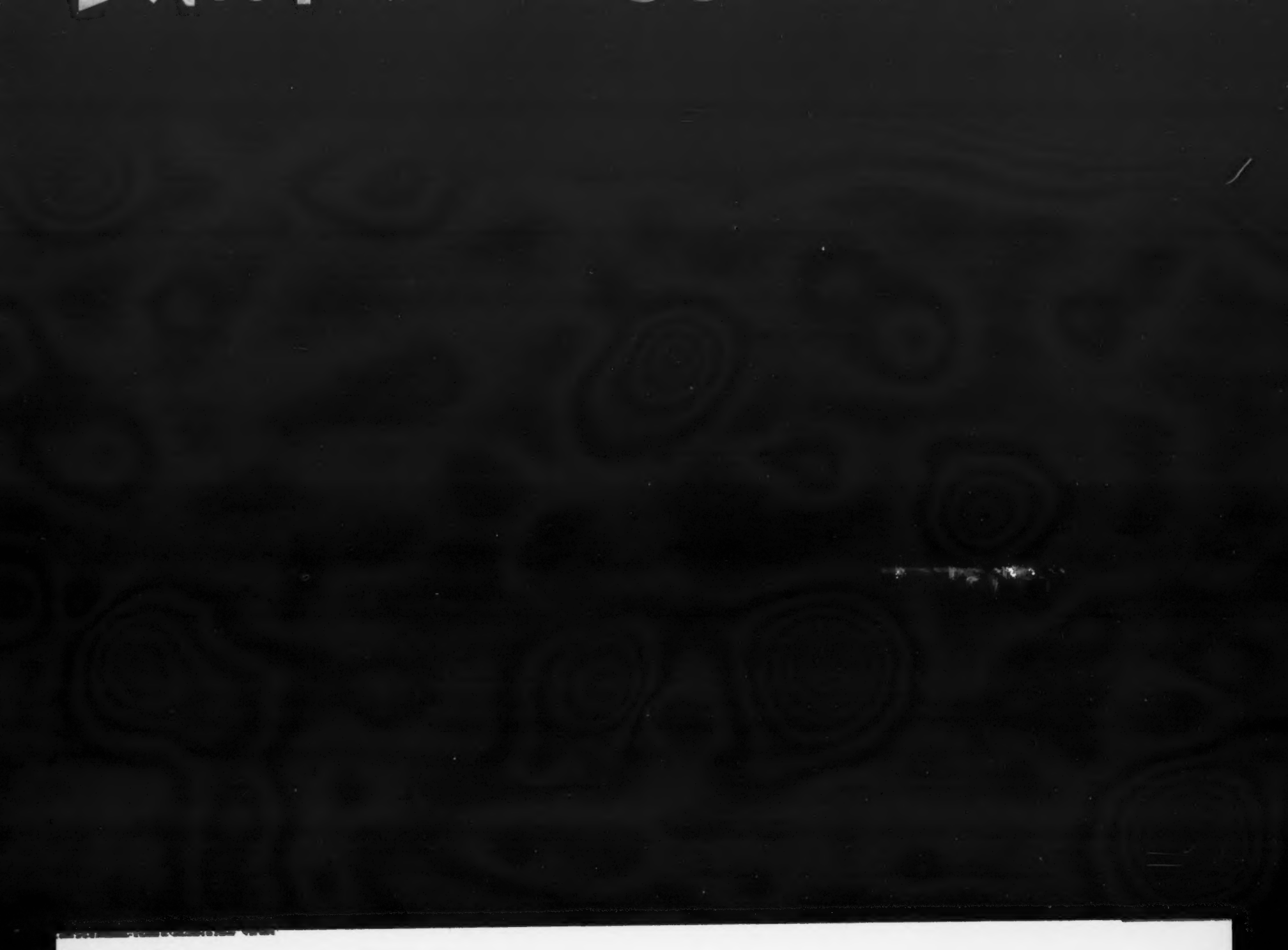
a complete remodeling of food habits; usually one or two additions or perhaps a substitute "snack" item will do the trick. Meaningful reasons for the recommendations should be presented to stimulate action. A teenager may resent being told to stop drinking carbonated beverages or eating sweets. Yet the suggestion to add a raw carrot to the lunchbox or to drink a milkshake with the after-school crowd has a good possibility of being followed.

The dental profession recognizes that a diet containing the recommended foods plays a significant role in the development of the teeth and in the maintenance of gum and jaw structures. In addition to good oral hygiene, periodic examinations and the use of fluoridated drinking water, the dentist often advocates foods containing the essential nutrients. Here, too, the advice to the patient should be personalized. The child or adult not over-fond of fresh milk will not begin drinking it just because "It's good for you." Learning the food habits of the patient may reveal a fondness for soups, creamed dishes, or puddings—all products which can be carriers of milk. The dentist may thus suggest the use of other dairy foods and more milk in cooked foods.

Public health workers reaching various community groups have many opportunities for teaching nutrition. During a home visit the public health nurse may transform nutrition facts into helpful hints for the homemaker on how to plan better meals. Undesirable methods of food preparation may be observed at a kitchen table conference; the time and the place would appear to be conducive to some needed suggestions on cooking to preserve food values. At a well-baby clinic mothers usually are receptive to dietary advice. The wise nurse will learn the family's food patterns and the related cultural, economic and emotional factors prior to recommending changes.

Acceptability of food depends upon several factors, including preparation methods, sanitary aspects and aesthetic appeal. The public health sanitarian, on routine inspections of restaurants, public dining rooms, and school lunchrooms, may foster improvements in nutrition through higher sanitation and food standards.

With planning and foresight nutrition can be integrated into a wide range of preventive and curative health programs. The nutritionist needs YOU to help sell "better health through better eating!"